HIGH PERFORMANCE INTERNATIONAL INTERNET SERVICES

Solicitation NSF97-106

I. Purpose

The U.S. National Science Foundation (NSF) seeks to assist the U.S. research and education community (R&E) in meeting its needs for next generation international Internet services. The goal is to provide the basis for the development of next generation applications supporting international collaborations and enabling interaction with global information and experimental resources. To this end, NSF solicits proposals for high-performance International Internet Services (HPIIS).

II. Summary

High performance Internet services (both international and domestic) will be based on high bandwidth communication links and new Internet features such as the ability to dynamically reserve network resources and to guarantee to applications various qualities of service (e.g., average and maximum packet delays, average and maximum throughput rates, error rates, etc.). Work is underway in the U.S. and other countries to develop national, continental, and intercontinental high performance Internet services for research and education. This solicitation seeks to extend U.S. participation in these global developments.

HPIIS will seek high-performance connectivity between the NSF's very High Speed Backbone Network Service (vBNS) and high performance networks of major international research partners.

NSF contemplates making a small number of awards for HPIIS in the form of (up to) five-year cooperative agreements. Total NSF support for HPIIS will not exceed $4.5 million per year.

Supported projects are intended to assist the U.S. R&E community by enabling international high performance Internet services similar to and interconnected with the U.S. high performance Internet services being developed under NSF's high performance Internet connections program (NSF 96-64)[1].

Because of the nature and geographic extent of the efforts that will be involved, interested parties are encouraged to form consortia of organizations that can work together to provide the needed

[1] http://www.cise.nsf.gov/ncri/connect96.html

services. Consortia may consist of any number of U.S. and foreign, profit and not-for-profit entities. Any award resulting from responses to this solicitation will be made to a U.S. institution.

In accordance with 31 USC 6301-6308, any awards resulting from this solicitation will be in the form of cooperative agreements since NSF is providing assistance to the U.S. research and education community and is not acquiring services for the U.S. government.

III. Background and Status

In 1990, NSF published the solicitation "International Connections to NSFNET" (ICM), NSF 90-69. The purpose of that solicitation was to consolidate the management and engineering of connections between the U.S. R&E community and similar communities abroad. In addition, the ICM program assisted other countries to connect to the global Internet by supporting an infrastructure for interconnection with the U.S. Internet.

The U.S. domestic NSFNET backbone network service was decommissioned in 1995, and U.S. backbone network services are now provided by a number of commercial Network Service Providers (NSPs). These NSPs interconnect at various places, including Network Access Points (NAPs).

NSF anticipates that most of the Internet traffic to and from U.S. R&E institutions will continue to originate at and be destined for non-R&E institutions; further, such traffic will continue to be provided for by commercial NSPs.

However, the R&E community is interested in developing and utilizing, on an accelerated schedule, next generation Internet services and applications, some of which are global in extent. To provide for this, a global research Internet infrastructure interconnecting the research Internet infrastructure of the U.S. R&E community with those of other interested countries is required. Because of the nature of many of the new applications, NSF anticipates that the intercontinental links required to implement HPIIS would *ideally* operate at bandwidths of 155 Mbps and above, as would the networks that they interconnect.

IV. Project Requirements

Proposers should carefully address all of the requirements listed below.

A. Partnership

Past experience with the ICM program has shown that, in addition to technical competence and adequate facilities, flexibility, corporate agility, and a spirit of partnership are important. This is in part a consequence of the dynamic and often unpredictable nature of the Internet. NSF intends to approach awards made pursuant to this Solicitation in the spirit of partnership on behalf of

service to the R&E community and will look for evidence of similar intent in proposals.

Proposing organizations are invited to provide evidence of their past approaches to flexibility, agility, and partnership in Sections E (Organization Description) and H (Implementation Plan) of their proposal, as set forth in Section VI of this solicitation.

B. Use of HPIIS

Although the vBNS was implemented to support network-intensive research applications, today's networking technology does not support application-based routing policies. Therefore, use of the vBNS is authorized on an institutional, rather than an application-based policy.

Consistent with the Acceptable Use Policy (AUP) for the vBNS,[2] HPIIS will be reserved for use by HPIIS-authorized R&E institutions, both U.S. and foreign, for communication with each other and with other designated institutions. U.S. HPIIS-authorized R&E institutions will include vBNS Authorized Institutions (vAIs) that have received high performance Internet connection awards from NSF[3] and vBNS Partner Institutions (vPIs) such as certain U.S. Government research laboratories that may be interconnected with the vBNS.

Institutions should be proposed for HPIIS authorization on the basis of their participation in research activities that require next generation Internet services such as quality of service (QoS) guarantees and/or resource reservation. Proposals should indicate which R&E institutions would become HPIIS-authorized, with a brief description of proposed collaborations with U.S. research institutions that would be supported by HPIIS authorization. Proposers should note that an important evaluation criterion relates to the value to the U.S. R&E community of the research collaborations at institutions that are proposed to be HPIIS-authorized.

In order to realize HPIIS connectivity policies, it is expected that networks connecting to the vBNS will cooperate with the operator of the vBNS (MCI) in its use of policy based routing and router configuration technology. Connecting networks will be expected to adopt new practices in cooperation with the vBNS operator as routing policy technology evolves.

Proposers must provide a plan for exchanging traffic, via the HPIIS, between the U.S. HPIIS-authorized R&E institutions (which are connected to a U.S. high performance Internet network such as the vBNS) and the proposed R&E institutions of connecting countries' networks. They should also indicate how they intend to exchange non-research-intensive "commodity" traffic with other

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[2] see http://www.cise.nsf.gov/ncri/vbnsaup.html

[3] see http://www.cise.nsf.gov/ncri/hp-connections.html for the current list of awardees

U.S. entities without using HPIIS. The plan should be presented in Section F (Engineering Plan) of the proposal.

The proposed exchange of traffic must avoid transit through U.S. domestic infrastructure because the vBNS and other U.S. high-performance R&E networks that might connect at Internet exchange points do not permit transit traffic. Connection facilities that support high-performance networking services are required, and end-to-end support for high-performance applications is also highly desirable. The "Science, Technology and Research Transit Access Point"(STAR TAP),[4] an available, but not mandatory, Internet exchange point, meets these conditions. Proposers should specify how their proposed U.S. interconnection plan meets the essential conditions specified above.

More generally, in accordance with the vBNS AUP, no transit traffic will be supported by HPIIS. That is, traffic between non-HPIIS-authorized institutions and/or traffic between an HPIIS-authorized institution and a non-HPIIS-authorized institution may not utilize the HPIIS unless special prior approval is given by NSF.

[4] see http://www.startap.net or contact the Principal Investigator of the STAR TAP project:
Prof. Thomas A. DeFanti
Director, Electronic Visualization Laboratory
University of Illinois at Chicago
851 S. Morgan Street, Room 1120
Chicago, IL 60607-7053 USA
+1-312-996-3002; +1-312-413-7585 FAX
Internet: tom@uic.edu

For example, consider a U.S. HPIIS-authorized university connected to the vBNS, and, as required, also connected to a commercial NSP. Consider further a network user at this university who wishes to communicate with a foreign site that is not an HPIIS-authorized institution. Such traffic may not be routed over the vBNS nor over the HPIIS. Instead, it should be routed over the university's commercial Internet connection and from there over a commercially-provided intercontinental Internet service.

Similarly, consider a user at a HPIIS-authorized foreign institution who wished to communicate with a non-HPIIS-authorized U.S. site served by a commercial network. Such traffic may not be routed over the HPIIS. Instead, it should be routed over commercially-provided Internet services.

C. vBNS Interoperability

The HPIIS must interoperate with the vBNS and possibly with other interconnected U.S. high performance research networks. Proposers should describe the proposed means to provide interoperability with the vBNS in Section F (Engineering Plan) and procedures for working with their providers in Section G (Operations, Monitoring and Quality Assurance Plan).

D. Internet Services Development

Both the current Internet Protocol (IPv4) and, as it becomes available,

the next generation Internet Protocol (IPv6) will be required for HPIIS. There will be a need to provide different classes of and qualities of service in response to dynamic requests from applications. Thus, Integrated Services protocols which provide for scheduling and resource reservation will also be required for HPIIS. Finally, service provision will require management and operations (monitoring, quality control, statistics collection, reporting, etc.) at multiple protocol levels.

Appropriate Technologies

The HPIIS should operate using technology that will provide a reliable, leading-edge service for R&E. During the period of the award, new network technologies should be introduced as appropriate. Proposals should specify (in Sections F, Engineering Plan, and H, Implementation Plan):

• the initial technology to be employed (Section F), and

• plans for the introduction of new networking technologies (Section H) .

The proposed technologies must be compatible with the research networks of the countries which are to be interconnected, and with their plans (where available) for the introduction of new technologies.

Internet Protocol Version Six (IPv6)

Proposers must provide a plan for adopting and / or transitioning to the next generation Internet Protocol (IPv6) and related services (in Sections F, Engineering Plan, and H, Implementation Plan).

Application Data Transfer Rate

Services that will support individual TCP sessions at end-to-end data transfer rates at tens of Mbps in an uncongested network are required. The system design for providing this capability consistent with high-capacity, long-distance delay products should be described in Section F (Engineering Plan) of the proposal.

E. Shared Infrastructure Proposals

If services are proposed as part of a general purpose Internet infrastructure, measures must be taken (subject to periodic review by NSF) to ensure that the HPIIS community is provided with the fair share of capacity, priority, and reliability subscribed under the HPIIS award, and on terms at least as favorable as those received by any other customer of the service provider

Proposers must describe and propose service metrics, control methods, and related service guarantees for providing HPIIS to the R&E community if a shared-link or other common infrastructure environment is proposed. Alternatively, proposers

may propose other innovative capacity pricing and quality of service (QoS) provisioning proposals within the scope of this solicitation that adequately and fairly serve the needs of the R&E community. This information should be provided in Section G (Operations, Monitoring and Quality Assurance Plan) of the proposal.

Discussion of performance monitoring for fair share and capacity determinations should be presented in Section G (Operations, Monitoring and Quality Assurance Plan) of the proposal. Capacity considerations should also be presented in Section D (Proposed Services), and related aspects of capacity pricing and provisioning should also be discussed, as applicable in Sections F (Engineering Plan), H (Implementation Plan), J (Business Plan) and K (Proposal Budget).

F. Security, Privacy, and Reliability

Awardees must participate within the Internet community to develop and deploy security and privacy capabilities for their service offerings. Emerging Internet developments may require the provision of network-level security measures, and the awardees must implement network security measures as appropriate as they are standardized and adopted.

Proposed approaches to providing security should be discussed in Section F (Engineering Plan) of the proposal.

Proposers should provide a system design, which may include more than one option, each separately priced, for providing robust service (Section F of proposal, Engineering Plan). Examples may include, but are not limited to, physical diversity, redundancy, back-up arrangements, etc.

Backup service, preferably of equivalent latency and capacity and provided within a maximum of one hour of loss of primary physical connectivity is desirable. For example, proposers should express a willingness, should multiple awards covering a particular geographic region be made, to work with NSF and other awardee(s) to provide mutual backup arrangements.

Proposals should contain service metrics and associated performance levels for providing reliable service to end-users over the portion of the end-to-end path to be provided by the proposer. These include availability, maintainability, peak daily utilization, and other metrics that proposers deem important (e.g., packet drop rate and end-to-end measurements such as round-trip-time and ratios of throughput at peak versus off-peak hours). This material should be presented in Section G (Operations, Monitoring and Quality Assurance Plan) of the proposal.

G. Reporting

Awardees must monitor and provide monthly reports of:

- **Availability** (percentage of service up time)
- **Utilization** (percentage of available resource actually used)
- **Application-specific traffic mixes**, e.g., by TCP Port (optional)

Awardees should also interpret measurement data and advise NSF of impending problems, needs, and noteworthy trends in service-specific and global contexts.

Monthly reports with performance-monitoring results and narratives as well as discussions of trends, problems, recommendations, etc., must be sent to the HPIIS Program Officer or published electronically by the fifteenth of the next month. Episodic reports should also be sent (by e-mail) to the HPIIS Program Officer, as warranted by circumstances.

At the conclusion of each program year, an Annual Report of the project's accomplishments must be sent to the HPIIS Program Officer along with a Program Plan for the next program year.

Reporting methods should be described in Section I (Reporting and Publication) of the proposal.

Public Information Dissemination

In addition to required reporting to NSF, awardees must provide public current status information by means of:

- Public World Wide Web Page(s) containing project descriptions and pointers to relevant information such as milestones, operational information such as outages (including trouble tickets), general performance parameters (such as circuit utilization "strip charts," circuit availability, scheduled down times), contact information for key people and/or functions (e.g., Network Information and Operations Centers)
- E-mail lists for disseminating operational status notifications
- Other means (e.g., inclusion in existing newsletters) as may be proposed

The proposed approach to public information dissemination should be described in Section I (Reporting and Publication) of the proposal.

V. Proposal Submission Information

Proposals must be prepared and submitted in accordance with the guidelines established in the **Grant Proposal Guide (GPG)**[5] with the

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[5]The NSF **Grant Proposal Guide (GPG)** (NSF 95-27) and the Proposal Forms Kit (NSF 95-28) are available on the World Wide Web at URL http://www.nsf.gov:80/bfa/cpo/gpg/start.htm.

exception that the 15-page limitation on proposal length is waived (proposers are urged not to exceed 50 pages; supporting material in excess of 50 pages may be included in appendices, but without guarantee that they will be read by the evaluators). All NSF publications referred to in this Solicitation can be accessed over the Internet as well as obtained from the sources indicated below.

Hard copy: Documents are also available in paper copy free of charge. Address requests to NSF, Attn.: Forms and Publications, 4201 Wilson Boulevard, Room P15, Arlington, VA 22230, (703) 306-1130 or by FAX (703) 644-4278. Internet users may send requests to pubs@nsf.gov. Each request should include the NSF publication number, title, number of copies, requester's name, and complete mailing address.

A. Who May Submit

Proposals may be submitted by U.S. entities (including academic institutions, not-for-profit organizations, or for-profit organizations), consortia of such U.S. organizations, and consortia of U.S. and foreign organizations. If an award is made to a consortium (either all-U.S. or U.S. and foreign in composition), it will be made to a U.S. member of the consortium and the Principal Investigator/Project Director (PI/PD) must be an employee of that organization.

It is recommended that appropriate administrative officials of the proposing organizations be familiar with the policies and procedures stated in the **NSF Grant Policy Manual**[6] (**GPM**) which are applicable to NSF awards. If a selected organization has not previously received an NSF award, the NSF Division of Grants and Agreements will request certain organizational, management, and financial information from the submitting organizations. This information must be submitted before any award is made. These requirements are described in Chapter V of the **GPM**.

B. Key Personnel, Including Principal Investigator (PI)

For each award made, the individual designated as PI/PD and other personnel deemed critical to the effort will be named in a key personnel clause. NSF approval is required prior to diversion or replacement of key personnel. The PI/PD will be the primary technical point of contact with NSF.

C. Proposal Submission and Due Date

Ten (10) copies of the proposal, including one copy bearing original signatures, must be mailed to:

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[6]The NSF **Grant Policy Manual (GPM)** (NSF 95-26) is available electronically on the World Wide Web at URL http://www.nsf.gov:80/bfa/cpo/gpm95/start.htm.

Proposal Processing Unit - Room P60
Attn.: International Internet Services Program, NSF 97-?
National Science Foundation
4201 Wilson Blvd.
Arlington, VA 22230

Only one (1) copy of NSF Form 1225, Information About PI/PD, should be sent, attached to the original signed proposal.

To be considered for award, proposals submitted in response to this solicitation must be:

(a) received by NSF no later than 3:00 PM EDST, on the deadline date of **August 15, 1997**; or

(b) postmarked no later than five (5) days prior to the deadline date; or

(c) sent via commercial overnight mail no later than two (2) days prior to the deadline date

D. Rights to Proposal Information

A proposal that results in an NSF award will become part of the record of the transaction and will be available to the public on specific request. Information or material that NSF, after consultation with the awardee, determines to be of a privileged nature will be held in confidence to the extent permitted by law, including the Freedom of Information Act (5 USC 552). Without assuming any liability for inadvertent disclosure, NSF will seek to limit dissemination of such information to its employees and, for purposes of evaluation of the proposal, to outside reviewers.

Accordingly, any privileged information contained in the proposal must be clearly marked or indicated (such as with an asterisk or highlighter) and identified by a legend similar to the following: "Following is [(proprietary) or (specify)] information that (name of proposing organization) requests not be released to persons outside the Government, except for purposes of evaluation."

VI. Contents of Proposal

Although page limits have been waived for proposals responding to this solicitation, overly lengthy proposals are not recommended. Proposals must be securely fastened together, but not placed in ring binders.

Proposals must contain the following Sections:

A. Cover Sheet, Certifications, and Summary Budget

Be sure to include all required forms, including a budget summary, that are reproduced in the **Proposal Forms Kit** (NSF 95-28) which appears at the end of the **GPG**. Particular attention is called to: Certification Page (NSF Form 1207, Page 2 of 2), which includes the "Certification Regarding Lobbying" and a certification regarding institutional

implementation and enforcement of an acceptable conflict of interest policy. Note that proposals without a fully executed Certification Page will not be processed by NSF.

B. Executive Summary

The summary should provide a brief (one to three page) description of the proposed effort.

C. Table of Contents

This should include page numbers keyed to the major sections of the proposal.

D. Proposed Services

In response to the Requirements set forth in Section IV of this Solicitation, this section should describe the proposed HPIIS-authorized Institutions, the rationale for their proposed authorization (based on the importance and quality of the research applications), the specific services to be provided, HPIIS (as opposed to "commodity") capacities to be provided, any service enhancement plans, and the relevant timelines.

The section should also include a brief statement of vision as to how the proposed HPIIS project should evolve, and relationship of the proposed services to the evolution of the Internet and to emerging international standards and Internet protocols.

E. Organization Description

This section describes the lead U.S. organization in detail and each additional organization (for consortium proposals), including:

- experience applicable to the provision, operation and management of the proposed project and, for the lead organization, evidence of effective project governance

- if a consortium and/or major sub-awards are proposed, qualifications of the consortium members and experience of the proposing organization in ensuring the performance of consortia and/or managing sub-awards; planned organization and governance of the consortium

- a description of each organization's proposed facilities (amount of detail to reflect the relative role of each organization)

- organization charts, to include the relationships among consortium members and/or sub-awardees

- documentation of technical and managerial qualifications of key personnel including those that are part of any sub-award. (*Curricula Vitae* of the Principal Investigator and other key individuals

should be provided in appendix A.) Current and pending support for key personnel should be identified.

F. Engineering Plan

The engineering plan should describe and illustrate the architecture and configuration(s) for providing HPIIS, connection interface(s) to the U.S. R&E community, routing plans, planned configuration(s) for providing next generation (differentiated) Internet services in the quantities proposed, security, robustness considerations, including backup and restoration, and development (e.g., protocols and service enhancements) effects on the foregoing, including an assessment of the risks and benefits of adopting the proposed new technologies.

G. Operations, Monitoring and Quality Assurance Plan

This plan should describe explicit procedures and facilities (with special emphasis on network operations centers and network information centers) for monitoring the quality, availability and effectiveness of the services provided. Procedures for fault isolation and problem resolution should be described.

Procedures should be proposed for working with personnel from the vBNS Provider and other appropriate networks to identify and to resolve problems and to support end-to-end connectivity and quality of service for network users.

The plan should also propose performance and quality of service guarantees and describe the measures and procedures on which they are based, including:

- a description and discussion of the rationale for and validity of proposed service metrics
- control methods and related service guarantees
- and, where applicable, guarantees for providing HPIIS to the U.S. R&E community in a shared link environment

H. Implementation Plan

The Implementation Plan should describe the proposed implementation of the services consistent with the engineering, operations, monitoring, and quality assurance plans. Proposed plans to assure high quality services to the R&E community during the transition to any proposed future developments should also be included.

I. Reporting and Publication

Methods should be described for furnishing informal status updates, quarterly and annual progress reports and annual program plans; publication of status, etc., in accordance with the requirements

set forth in Section IV.A of this solicitation.

In addition, the methods for making information about operational and project status available to Internet operators (e.g., configuration and trouble tickets) and to the general public (World Wide Web and other networked presence, brochures, etc.) should be identified.

J. Business Plan

The Business Plan describes how the proposing lead organization and other consortium members, where applicable, will continue to provide HPIIS after the expiration of the NSF award.

K. Proposal Budget

The proposal should provide cumulative and annual budgets for funds requested in NSF Form 1030 as well as a budget narrative for each year. The narratives should include sufficient detail to explain and justify the proposed price and value over the period of the award.

Each year's budget narrative must contain information about the specific services proposed and must explain the significant prices-to-NSF associated with each service provided.

The pricing information requested above must provide a quantifiable basis for determining the reasonableness of the proposed price to be paid by NSF. Examples of supporting information include:

- documented estimates of the value or current market price of the proposed services
- measurable criteria such as price per unit of bandwidth made available to the U.S. R&E community;
- service metrics and/or quality-of-service parameters (per Section IV.B. of this solicitation) and their relation to proposed pricing;
- market value of special supplies, over and above the service provider's standard equipment, needed to provide the required services.

Additional detail on indirect cost rates, fringe benefit rates, fees, and accounting systems may be requested prior to award. Indirect cost rate agreements negotiated with cognizant Federal agencies are generally accepted by NSF. Please note that NSF does not typically fund Independent Research and Development (IR&D) and/or Facilities Capital Cost of Money (FCCM) as part of an indirect cost rate.

Appendix A. Curricula Vitae

Curricula Vitae of the Principal Investigator and other key individuals from all organizations who will be directly involved in the management and operation of the project should be provided in this appendix. Lists of publications and patents for each individual

should be limited to the five most relevant. Resulting awards will include conditions requiring NSF approval of any changes in key personnel during the project**.**

Appendix B. Letters of intent from other consortium members

Proposing organizations should include a letter of intent from each consortium member, where applicable. These letters should be signed by an authorized organizational representative.

VII. Evaluation of Proposals

Evaluation of proposals will be administered by Division of Networking and Communications Research and Infrastructure (NCRI). The proposals will be reviewed by one or more merit review panels chosen by NSF from a broad cross-section of the networking community, including international networking specialists. At the discretion of NSF, site visits may also be conducted.

The proposals offering the greatest overall merit in meeting the requirements of the HPIIS Program will be determined in accordance with the following special criteria.

- R&E institutions proposed for HPIIS-authorization, and the rationale for proposing them, based on the importance of intended research collaborations with U.S. vBNS-authorized institutions

- Ability to obtain, operate, monitor, and maintain high-capacity low delay circuits and to provide high-performance Internet services on them

- Quality of the Engineering Plan

- Quality of plans for exchanging traffic with the participating U.S. R&E institutions

- Quality of plans for providing “commodity” Internet services for the HPIIS-authorized R&E institutions to communicate with the non-HPIIS authorized institutions

- Demonstrated ability to interoperate with U.S. and non-U.S. service providers

- Capabilities of Network Operations Center(s)

- Quality of plans for enhancing the robustness of services, including restoral and backup services

- Demonstrated ability to manage large routing tables and routing table updates

- Ability to support individual TCP session end-to-end data transfer rates at tens of Mbps (or more)

VIII. Award Information

Support for this program is contingent on the availability of funds. This solicitation does not obligate the NSF to make awards, and NSF reserves the right to make no awards.

The total NSF funding expected for HPIIS is $4.5 million per year. The number of awards made will depend, among other things, on the amount of funds requested from NSF by recommended proposals.

Within the context of the cooperative agreements, NSF may negotiate with HPIIS awardees for similar and/or related services required by the US R&E community as such needs arise. This approach is taken because of the increasing importance to the R&E community of remote access to computational databases, resources and collaboration technology, the rapid development and deployment of newer technologies to provide such access, the unpredictable geographic nature of research, and the unforseeability of specific requirements for individual research activities. (It is further contemplated that negotiations of this type will be conducted on a "rapid-response" basis.)

Awards made for HPIIS will be in the form of cooperative agreements for a period of up to five years. It is expected that any resulting awards will be announced in late 1997 (FY98).

Following the awards, the service providers will be required to develop operational agreements with the vBNS Provider, MCI, and with other organizations as required.

Upon completion of any NSF award, a Final Project Report (NSF Form 98A), including the Part IV Summary, will be required. Proposers should review this form prior to proposal submission so that appropriate tracking mechanisms are included in the proposal plan to ensure that complete information will be available at the completion of the project.

The progress, plans, and services of all the providers will be assessed annually. In particular, the quality and quantity of the services should be ascertainable annually during the period of the award by performance measures which the proposers must develop and adopt, and which NSF must approve. Determination(s) may be made at any time about any additional, increased, decreased, or modified services within the general scope and context of the award, and NSF may negotiate appropriate modification(s) to the award(s).

In addition to annual review by NSF, the HPIIS projects will be externally reviewed after 18 months of operation to provide additional input to NSF regarding the performance of the awardee(s) and to recommend any appropriate award modifications.

Awards resulting from this Solicitation are administered in accordance with the terms and conditions of **Grant General Conditions** (NSF GC-1) and **Cooperative Agreement General Conditions** (NSF CA-1).

IX. Questions about this Solicitation

In order that all proposers receive the same information, all questions regarding this Solicitation should be directed to the NSF in the manner indicated below. **All questions must be submitted in writing. Questions must be received by 3:00 P.M. Eastern Standard Time, June 13, 1997,** at:

National Science Foundation
Division of Networking and Communications Research and Infrastructure
4201 Wilson Boulevard, Room 1175
Arlington, VA 22230
Attn.: S. Goldstein (International Internet Services Inquiry)

Facsimile questions may be submitted to 703-306-0621, and electronic mail questions may be submitted to sgoldste@nsf.gov

Telephone questions will not be accepted.

Substantive questions received and the NSF's answers to them will be posted on NCRI's home page[7] approximately twenty-eight (28) calendar days thereafter.

[7] http://www.cise.nsf.gov/ncri

X. Other Programs of Interest

NSF Guide to Programs Fiscal Year 1997 (NSF 97-30), available electronically, or from the NSF Forms and Publications Unit, briefly describes Foundation programs. Proposers may also consult the **GPG** for additional guidance.

XI. GENERAL INFORMATION

The Foundation provides awards for research in the sciences and engineering. The awardee is wholly responsible for the conduct of such research and preparation of the results for publication. The Foundation, therefore, does not assume responsibility for the research findings or their interpretation.

The Foundation welcomes proposals from all qualified scientists and engineers and strongly encourages women, minorities, and persons with disabilities to compete fully in any of the research related programs described here. In accordance with federal statutes, regulations, and NSF policies, no person on grounds of race, color, age, sex, national origin, or disability shall be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity receiving financial assistance from the National Science Foundation. Programs described in this publication are in Category 47.070

(Computer and Information Science and Engineering) in the Catalog of Federal Domestic Assistance.

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF projects. See the program announcement or contact the program coordinator at (703) 306-1636.

Privacy Act and Public Burden. The information requested on proposal forms is solicited under the authority of the National Science Foundation Act of 1950, as amended. It will be used in connection with the selection of qualified proposals and may be disclosed to qualified reviewers and staff assistants as part of the review process; to applicant institutions / grantees; to provide or obtain data regarding the application review process, award decisions, or the administration of awards; to government contractors, experts, volunteers, and researchers as necessary to complete assigned work; and to other government agencies in order to coordinate programs. See Systems of Records, NSF 50, Principal Investigators / Proposal File and Associated Records, and NSF-51, 60 Federal Register 4449 (January 23, 1995). Reviewer / Proposal File and Associated Records, 59 Federal Register 8031 (February 17, 1994). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of your receiving an award.

Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Gail McHenry, Reports Clearance Officer, Division of Contracts, Policy, and Oversight, National Science Foundation, 4201 Wilson Boulevard, Arlington, VA 22230.

The National Science Foundation has TDD (Telephonic Device for the Deaf) capability, which enables individuals with hearing impairment to communicate with the Foundation about NSF programs, employment, or general information. To access NSF TDD, dial (703) 306-0090; for FIRS, 1-800-877-8339.

OMB# 3145-0058
P.T. 18, 36; and K.W. 1004000, 1004001, 0901011, 1014001
NSF 97-106